

## CHAPTER 4

## MAINTENANCE AND REPAIR (M&amp;R) GUIDELINES

**4-1. Introduction**

M&R needs and priorities are highly related to the PCI, since the PCI is determined by distress information which is a key factor in establishing pavement M&R requirements. This chapter describes how to do a payment evaluation, how to determine feasible M&R alternatives, and how to establish M&R priorities. These guidelines should be based on the PCI, with consideration given to other important factors including pavement load-carrying capacity. Nondestructive pavement testing techniques may be used in this load-carrying capacity evaluation. A specific M&R alternative can often be selected for a pavement section that is in very good or excellent condition without a life-cycle cost analysis. In cases where a life-cycle cost analysis is necessary to select among feasible alternatives, the life-cycle cost analysis method described in chapter 5 should be used.

**4-2. Pavement evaluation procedure**

Evaluation is performed on a section-by-section basis since each section represents a unit of the pavement network that is uniform in structural composition and subjected to consistent traffic loadings. It is necessary to make a comprehensive evaluation of pavement condition before rational determination of feasible M&R alternatives can be made. A step-by-step description of how to complete the DA Form 5147-R, Section Evaluation Summary (fig. E-3) is given below. An example of a completed DA Form 5147-R is shown at figure 4-1.

*a. Overall condition.* The PCI of a pavement section describes the section's overall condition. The PCI, and thus the section condition rating (e.g., good or very good), is based on many field tests and represents the collective judgment of experienced pavement engineers. In turn, the overall condition of the section correlates highly with the needed level of M&R. In figure 4-1 the PCI of the section under consideration was 15, so that number was recorded on line 1 and the appropriate rating-"very poor"-circled.

*b. Variations of the PCI within section.* PCI variation within a section can occur on a localized random basis, and/or a systematic basis. Figure 4-2, which was developed from field data, gives guidelines

that can be used to determine whether variation exists. When a PCI value of a sample unit in the section is less than the sample unit critical PCI value, a localized random variation exists. For example, if the mean PCI of a section is 59, any sample unit with a PCI of less than 42 should be identified as a localized bad area by circling "Yes" under item 2a on the form. This variation should be considered when determining M&R needs. Systematic variation occurs whenever a large, concentrated area of a section has significantly different condition. For example, if traffic is channeled into a certain portion of a large parking lot, that portion may show much more distress or be in a poorer condition than the rest of the area. Whenever a significant amount of systematic variability exists within a section, the section should be subdivided into two or more sections. In that example being considered (fig 4-1) there was no localized random or systematic variation, so "No" was circled at both lines 2a and 2b.

*c. Rate of deterioration of condition-PCI.* Both the long and short-term rate of deterioration of each pavement section should be checked. The long-term rate is measured from the time of construction or time of last overall M&R (such as an overlay). The rate is determined as low, normal, or high using figures 4-3 through 4-6. The figures are for the following four payment types respectively: asphalt concrete (AC) pavements, AC overlay over AC pavements, Portland cement concrete (PCC) pavements, and AC overlay over PCC pavements. Development of the curves delineating the low, normal, and high rate of deterioration was based on field data from Fort Eustis, Virginia. For example, an AC pavement that is 20 years old with a PCI of 50 is considered to have a high long-term rate of deterioration with respect to other AC pavements. Short-term deterioration (i.e., a drop in PCI during the last year) should also be determined since a high short-term deterioration rate can indicate the imminent failure of a pavement section (fig. 4-7). In general, whenever the PCI of a section decreases by 7 or more PCI points in a year, the deterioration rate should be considered high. If the loss in PCI points is 4 to 6, the short-term deterioration rate should be considered normal. It

# Section Evaluation Summary

For use of this form, see TM 5-623; the proponent agency is USACE.

1. Overall Condition Rating - PCI 15

Rating - Failed - Very Poor, Poor, Fair, Good, Very Good, Excellent  
 PCI 0-10 11-25 26-40 41-55 56-70 71-85 86-100

2. Variation of Condition Within Section -- PCI

a. Localized Random Variation Yes, No

b. Systematic Variation: Yes, No

3. Rate of Deterioration of Condition -- PCI

a. Long-term period (since construction or last overall repair) Low, Normal, High

b. Short-term period (1 year) Low, Normal, High

4. Distress Evaluation

a. Cause

Load Associated Distress 80 percent deduct value

Climate/Durability Associated 20 percent deduct value

Other ( ) Associated Distress 0 percent deduct value

b. Moisture (Drainage) Effect on Distress Minor, Moderate, Major

5. Deficiency of Load-Carrying Capacity No, Yes

6. Surface Roughness Minor, Moderate, Major

7. Skid Resistance/Hydroplaning Potential Minor, Moderate, Major

8. Previous Maintenance Low, Normal, High

9. Comments: \_\_\_\_\_

\_\_\_\_\_

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DA FORM 5147-R, NOV 82

Figure 4-1. An Example of a Completed DA Form 5147-R, Section Evaluation Summary.

should also be emphasized that short-term deterioration cannot be accumulated to arrive at a long-term rate evaluation. In the example being considered (fig 4-1)

long-term deterioration falls in the normal area and short term is calculated to be 5, also normal; so "Normal" is circled at 3a and 3b.

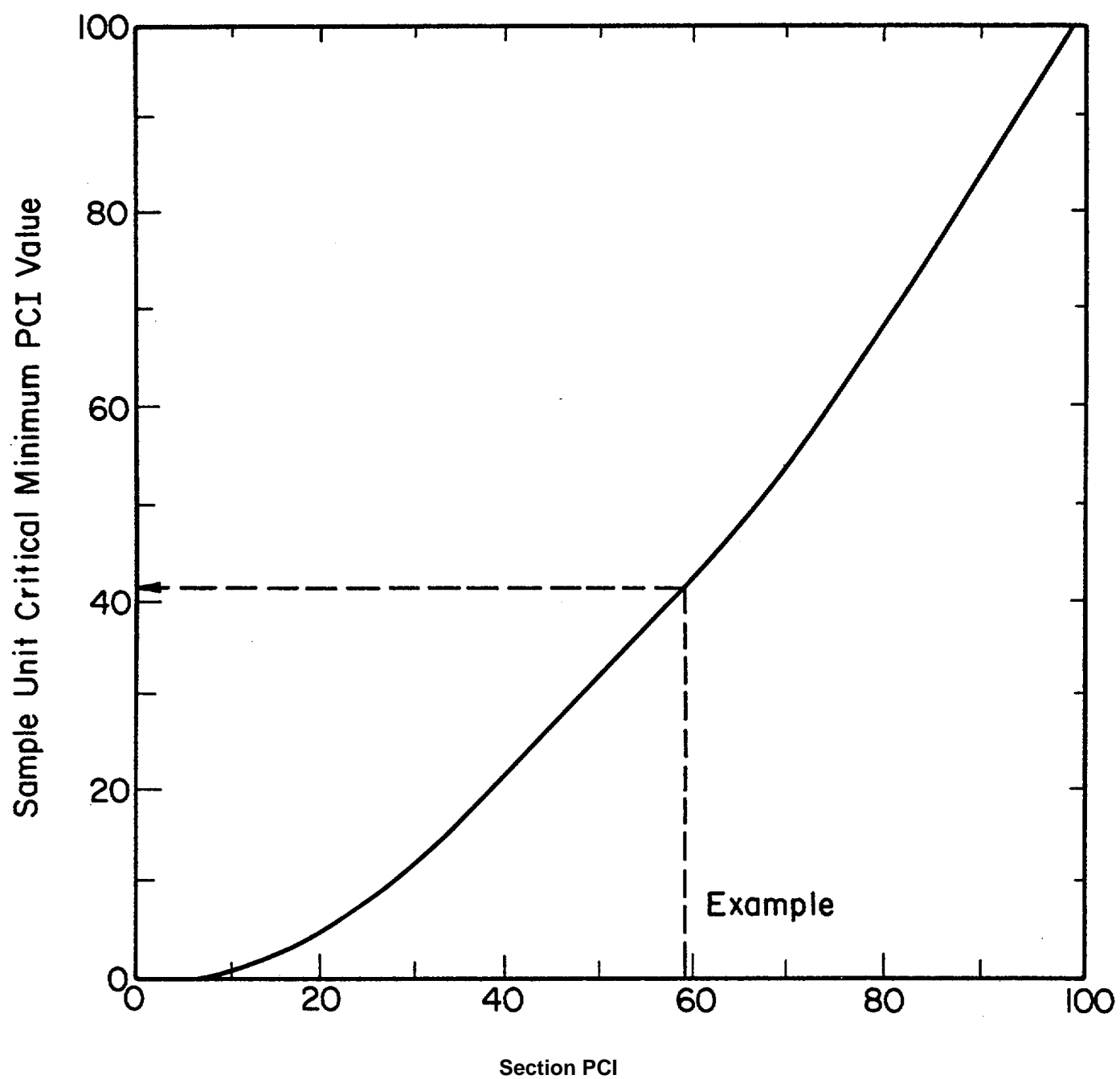


Figure 4-2. Procedure to determine critical minimum sample unit PCI based on mean PCI of section.

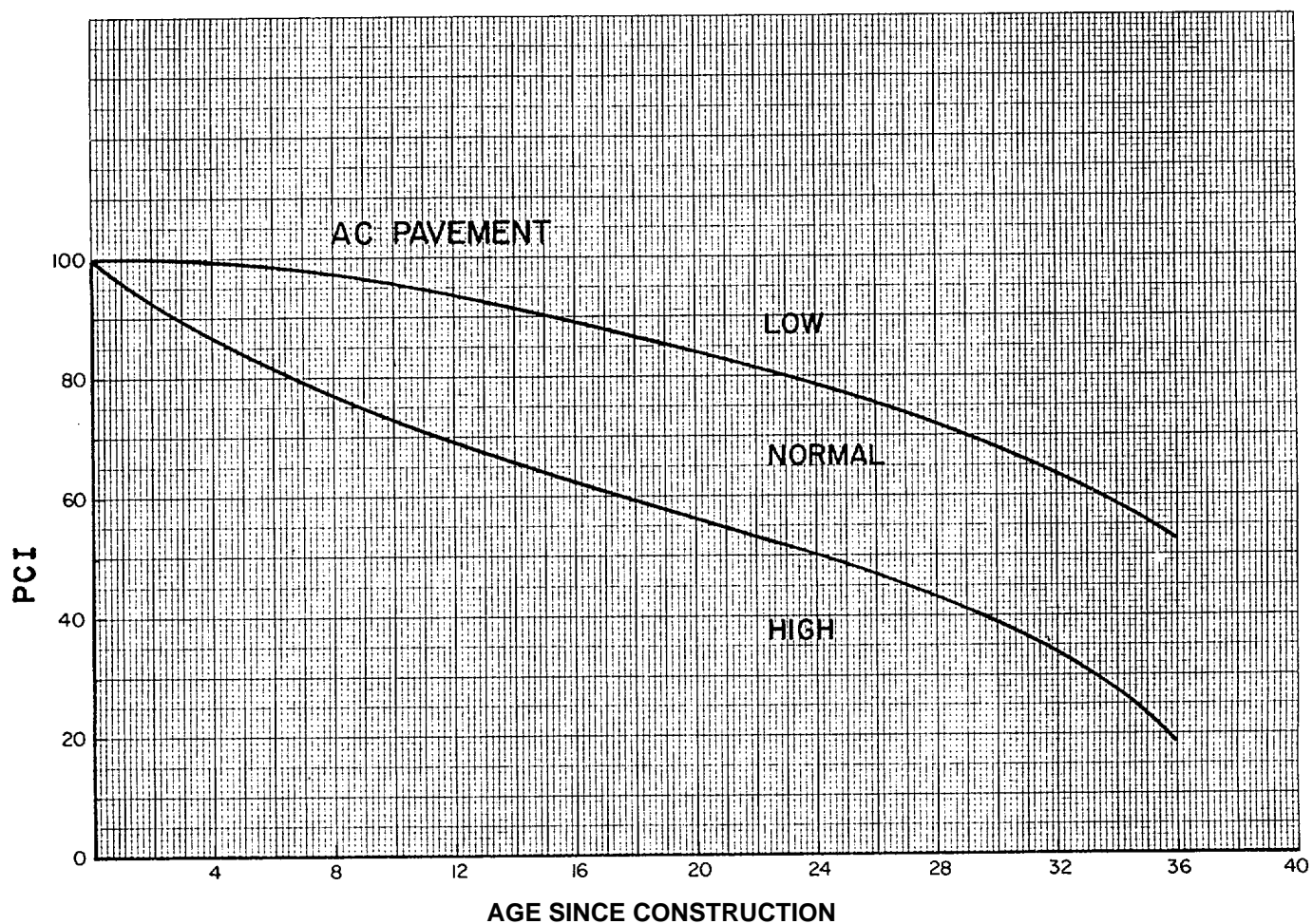


Figure 4-3. Determination of long-term rate of deterioration for asphalt concrete (AC) pavements.

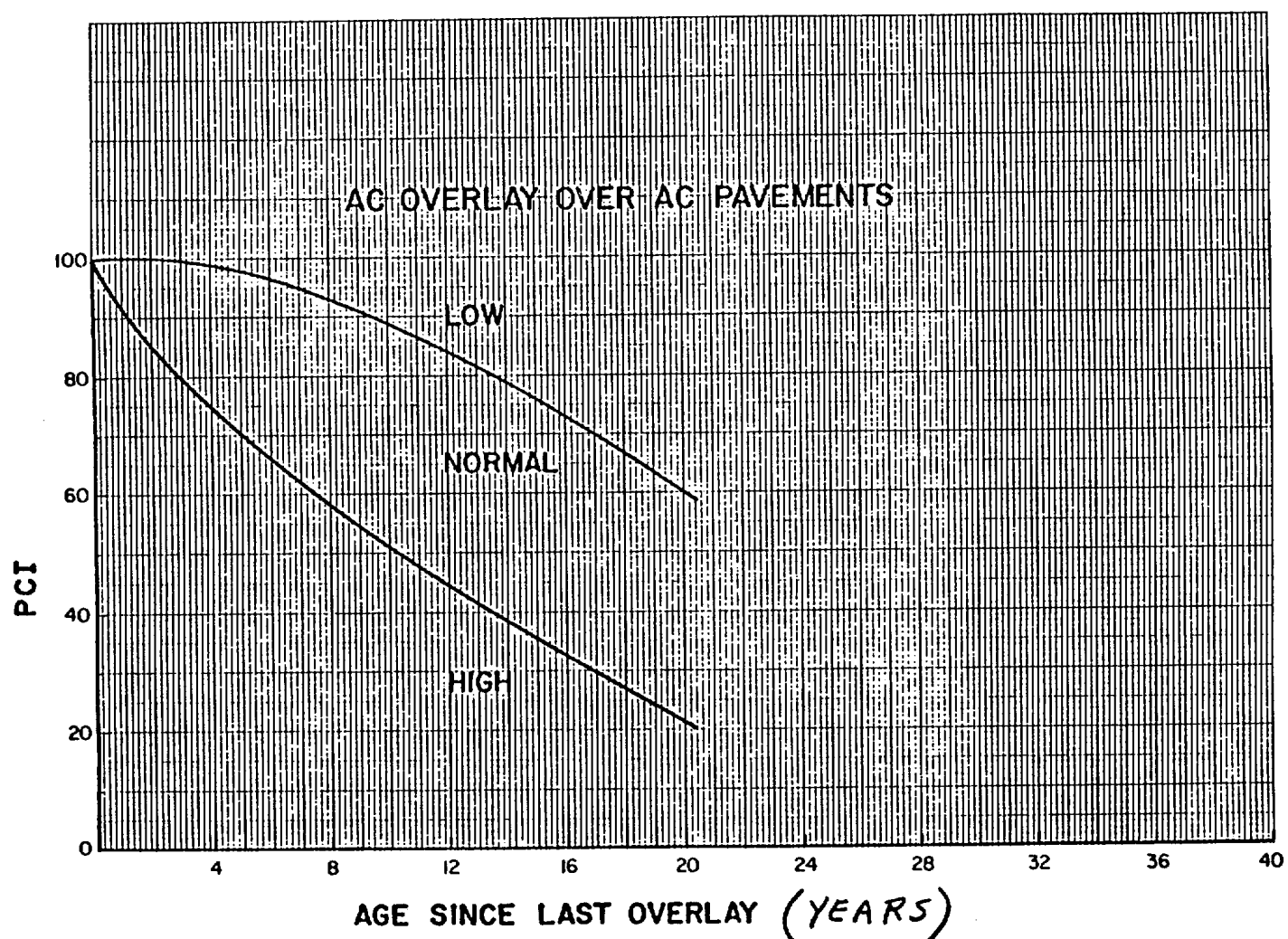


Figure 4-4. Determination of long-term rate of deterioration for asphalt concrete (AC) overlay over AC pavements.

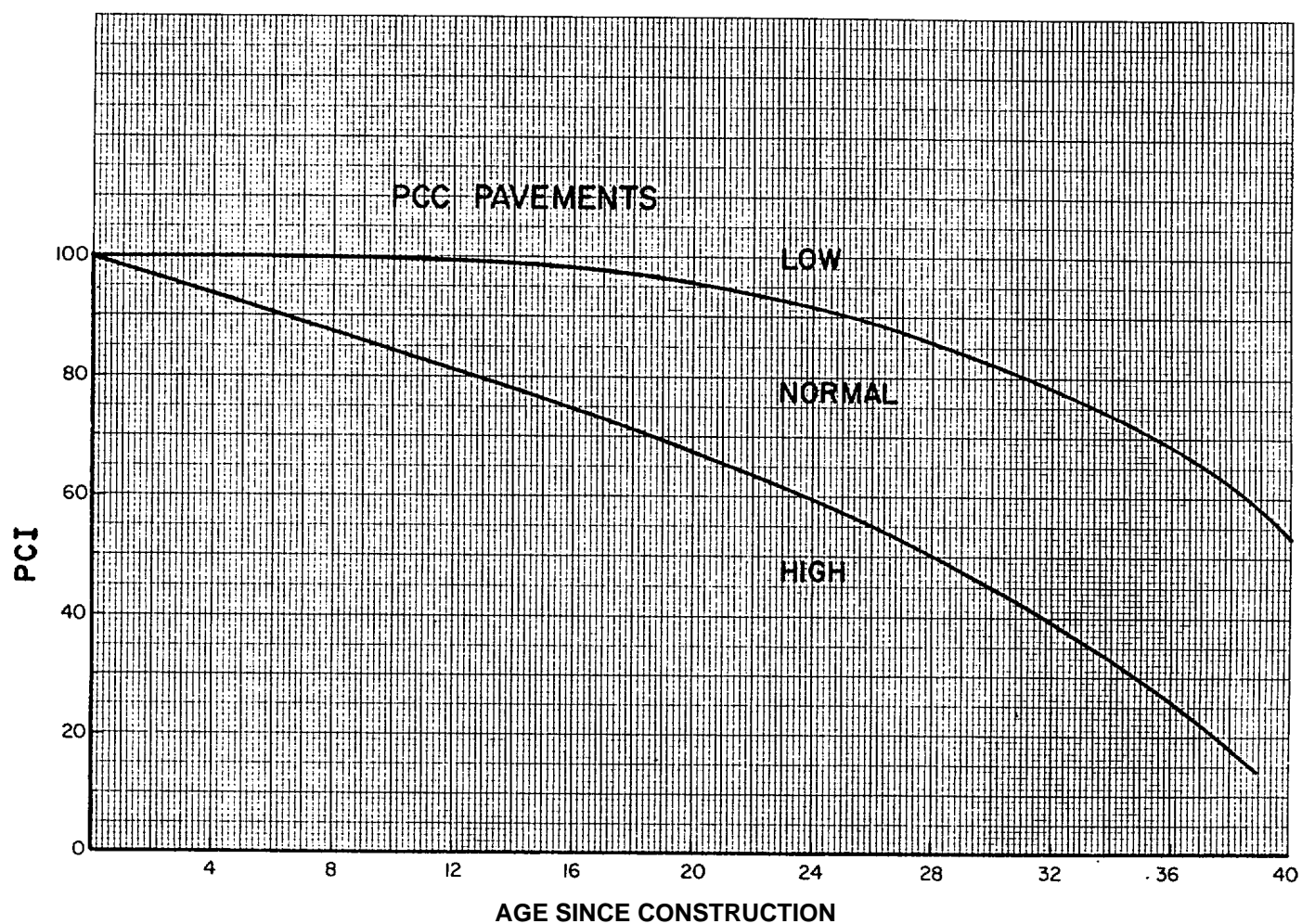


Figure 4-5. Determination of long-term rate of deterioration for Portland Cement Concrete (PCC) pavements.

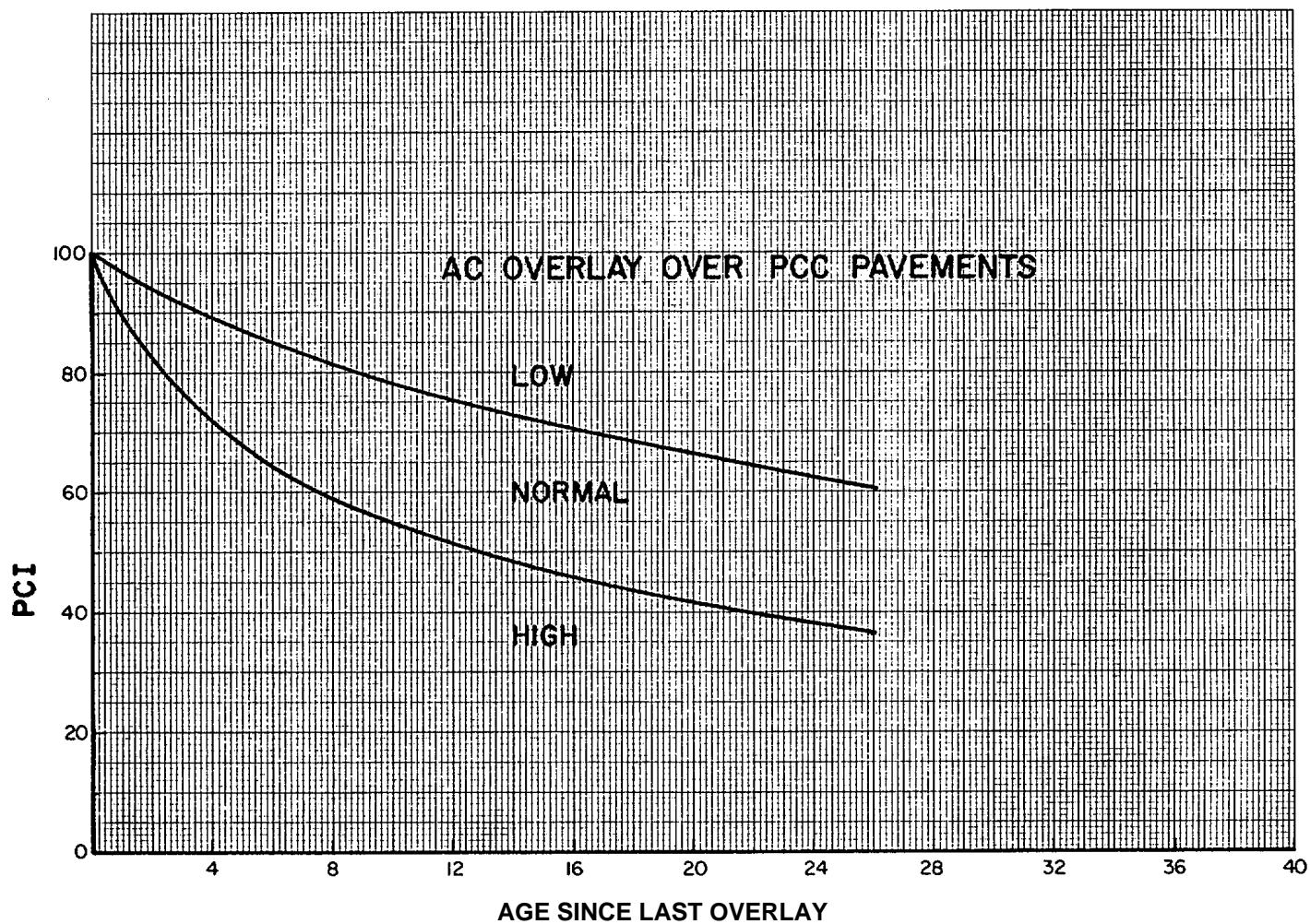


Figure 4-6. Determination of long-term rate of deterioration for asphalt concrete (AC) overlay over Portland Cement Concrete (PCC) pavements.

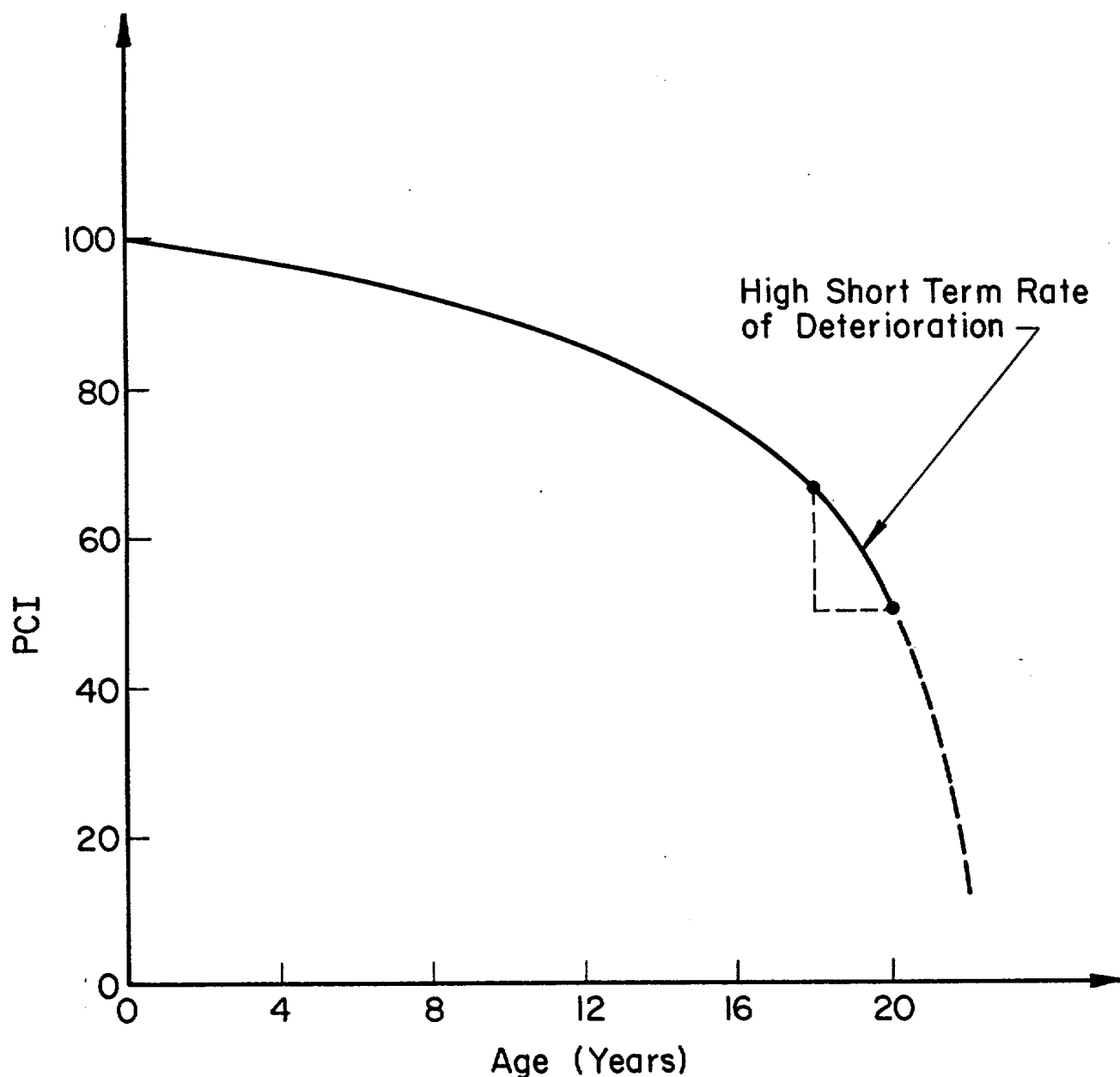


Figure 4-7. PCI vs age illustrating high short-term rate of deterioration.

d. *Distress evaluation.* Examination of the specific distress types, severities, and quantities present in a pavement section can help identify the cause of pavement deterioration, its condition, and eventually its M&R needs. Tables 4-1 and 4-2 list general classification of distress types for asphalt-and concrete-surfaced pavement according to their cause and effect on pavement conditions. Conditions at each pavement section will dictate which distresses will be placed in

each group. For evaluation purposes (fig 4-1), distresses have been classified into three groups based on cause. These groups are load associated, climate/durability associated, and other factors. In addition, the effect of drainage on distress occurrence should always be investigated. The following steps should be followed to determine the primary cause or causes of pavement condition deterioration for a given pavement section.



Table 4-1. General Classification of Asphalt Distress Types by Possible Causes  
POSSIBLE CAUSES

<i>Load</i>	<i>Climate/durability</i>	<i>Moisture/drainage</i>	<i>Other factors</i>
Alligator Cracking	Bleeding	Alligator cracking	Corrugation
Corrugation	Block cracking	Depression	Bleeding
Depression	Joint reflection cracking	Potholes	Bumps and sags
Edge cracking	Longitudinal and transverse cracking.	Swell	Lane/shoulder drop off
Patching of road-caused caused distress	Patching of climate/durability-swell caused distress.		
Polished aggregate	Potholed		
Potholes	Swell		
Rutting	Weathering and raveling		
Slippage cracking			

Table 4-2. General Classification of Concrete Distress Types by Possible Causes  
POSSIBLE CAUSES

<i>Load</i>	<i>Climate/durability</i>	<i>Moisture/drainage</i>	<i>Other factors</i>
Corner break	Blow-up	Corner break	Faulting
Divided slab	"D" cracking	Divided slab	Lane/shoulder drop off
Linear cracking	Joint seal damage	Patching of moisture-caused distress	Railroad crossing
Patching of load-associated distress	Linear cracking	Pumping	
Polished aggregate	Patching of climate/durability-associated distress		
Punchout	Popouts		
Spalling (joint)	Pumping		
	Scaling		
	Shrinkage Cracks		
	Spalling (joint)		
	Spalling (corner)		

(1) *Step 1.* The total deduct values (TDVs) attributable to load, climate/durability, and other associated distresses are determined separately. In the example being considered (fig. 4-1) the following distresses and TDVs were measured on an asphalt section of pavement.

<i>Distress type</i>	<i>Distress density over section</i>	<i>Severity level</i>	<i>Deduct value</i>	<i>Probable cause</i>
Alligator cracking .....	10	M	47	Load
Transverse cracking .....	3	M	17	Climate/durability
Rutting .....	5	L	21	Load
Total .....			85	

The TDV attributable to load is 68; the TDV attributable to climate durability is 17.

(2) *Step 2.* The percentage of deducts attributable to load, climate/durability, and other factors can be computed as described below; the following is based on the example in (1) above:

Load = 6%<sub>s</sub> X 100 = 80 percent  
 Climate/durability = 17/8<sub>s</sub> x 100 = 20 percent  
 Total = 100 percent

(3) *Step 3.* The percent deduct values attributable to each cause are the basis for determining the primary cause(s) of pavement deterioration. In the example given in (1) and (2) above, distresses caused primarily by load have resulted in 80 percent of the total deducts, whereas all other causes have produced only 20 percent. Thus, traffic load is by far the major cause of deterioration for this pavement section. These percentages are indicated on figure 4-1, an example of a completed DA Form 5147-R (Section Evaluation Summary).

(4) *Step 4.* The drainage situation of each pavement section should also be investigated. If moisture is causing accelerated pavement deterioration, it must be determined how it is happening and why (groundwater table, infiltration of surface water, ponding water on the pavement, etc.). If moisture is contributing significantly to the rate of pavement condition deterioration, ways must be found to prevent or minimize this problem. For example, if pumping occurs in concrete joints or cracks, drainage conditions should be examined and foundation support evaluated. Any drainage and foundation defects should be corrected and the joints or cracks filled or sealed. The appropriate effect should be circled on the form. In our example, figure 4-1, circle "MINOR" in line 4b.

*e. Deficiency of load-carrying capacity.*

(1) Before it can be determined whether an existing pavement section is strong enough to support a particular traffic condition, it is necessary to determine the pavement's load-carrying capacity. Methods for determining load-carrying capacity are given in TM 5-822-5 (AFM 88-7) and TM 5-822-6 for roads, and TM 5-827-2 (AFM 88-24) and TM 5-827-3 for airfield pavements.

(2) For example, assume an asphalt pavement section has the following structural composition:

Layer	Thickness	California bearing ratio (CBR)
Subgrade .....	.....	10
Base.....	10 inches.....	40
Surface .....	4 inches.....	-

Further assume that this pavement section is a Class A road (see table 4-3) subjected to the following traffic load:

Traffic type	Vehicles/day	Percent of total traffic
Passenger cars .....	1400	85

Two-axle trucks .....	200	12
Trucks with three or more axles.....	50	3

*Table 4-3. Design Index for Flexible Pavements for Roads and Streets, Traffic Categories I Through IV<sup>a</sup>*

Class road Category or street	Category I	Category III	Category IV	
A	3	4	5	6
B	3	4	5	6
C	3	4	4	6
D	2	3	4	5
E	1	2	3	4
F	1	1	2	3

Category I. Traffic essentially free of trucks (99 percent group 1, plus 1 percent group 2).

Category II. Traffic including only small trucks (90 percent group 1, plus 10 percent group 2).

Category III. Traffic including small trucks and a few heavy trucks (85 percent group 1, plus 14 percent group 2, plus 1 percent group 3).

Category IV. Traffic including heavy trucks (75 percent group 1, plus 15 percent group 2, plus 10 percent group 3).

Group 1. Passenger cars and panel and pickup trucks.

Group 2. Two-axle trucks.

Group 3. Three-, four-, and five-axle trucks.

<sup>a</sup>From TM 5-822-5.

(3) According to the information in subparagraph (1) above and table 4-3, the design index for this pavement section is 5. Based on the information in figure 4-8, the pavement thickness required over a CBR of 10 is 12Y inches; over a CBR of 40, the required thickness is 4.0 inches. Therefore, this pavement section is structurally strong enough for the load it is carrying, and load-carrying capacity deficiency is circled "No" in our example, figure 4-1, line 5.

*f. Surface roughness.*

(1) Surface roughness is an important operational condition. Although a rough pavement will usually have a low PCI, the reverse is not necessarily true. For example, a pavement section may have a high percentage of medium-severity alligator cracking (a serious structural distress) and, thus, a low PCI. However, if this is the only distress present, the pavement surface may not be rough.

(2) Minor, moderate, or major surface roughness can be determined by riding over the pavement section at its speed limit and observing its relative riding quality. In our example, figure 4-1, surface roughness was moderate; so "Moderate" was circled at line 6.

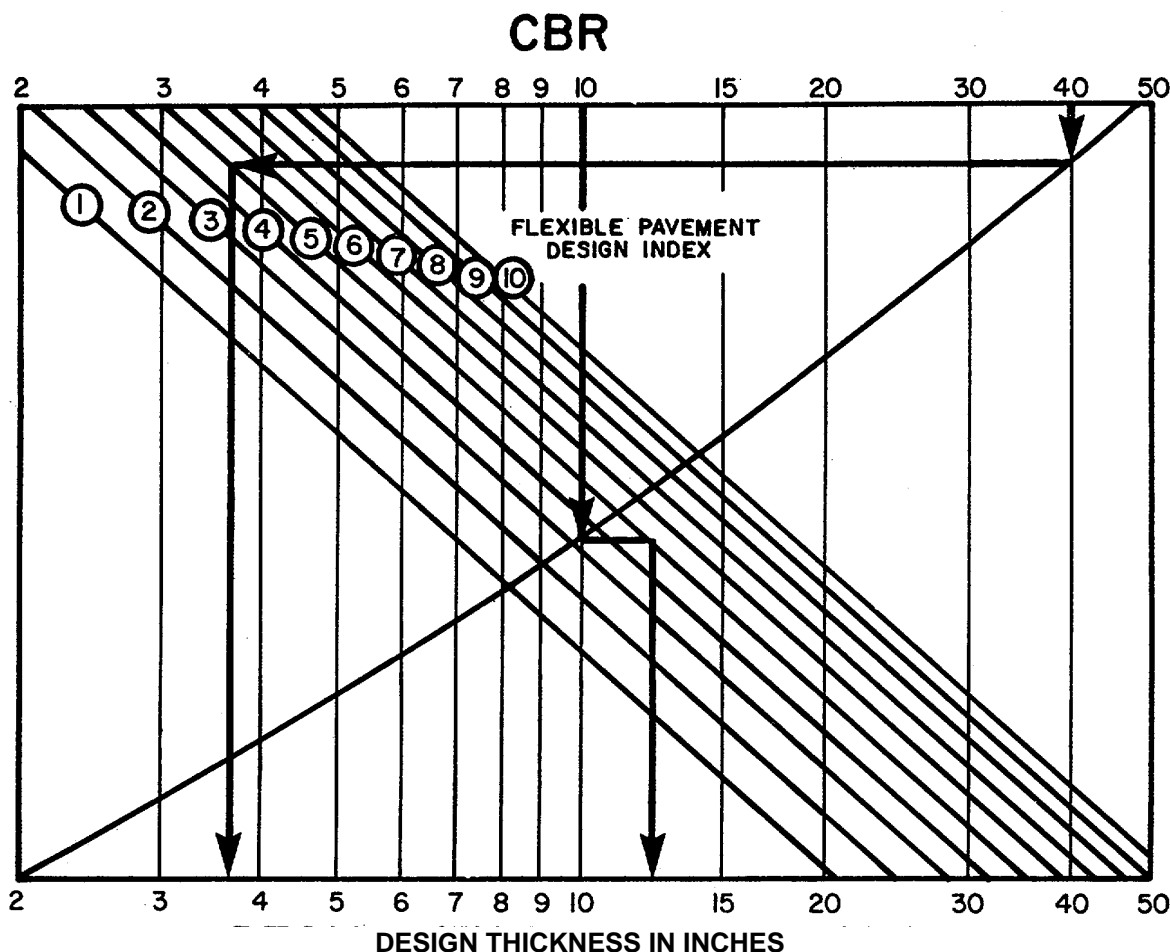


Figure 4-8. Thickness design requirements for flexible pavements (TM 5-822-5, 1 Oct 80, and AFM 88-24, Chap 3).

*g. Skid resistance/hydroplaning potential.* Skid resistance and hydroplaning potential are only of concern for high-speed-traveled roads and airfields. Pavement sections where skid is not of concern should be listed as such on the pavement evaluation sheet. Otherwise, skid resistance must be directly measured with special equipment. If direct measurement is not possible, skid resistance/hydroplaning potential may be evaluated by reviewing distress date. Distresses that can cause skid resistance/hydroplaning potential are bleeding, polished aggregates, rutting, and depression (for asphalt pavements) and polished aggregate (for concrete pavements). In our example, figure 4-1, skid resistance of "Minor" was circled at line 7.

*h. Previous maintenance.*

(1) A pavement section can be kept in operating condition almost indefinitely if extensive maintenance is performed. However, there are many drawbacks to this maintenance strategy, including overall cost, section downtime, increase in roughness

caused by excessive patching, limitations of manpower and equipment, and pavement mission requirements. Therefore, the amount and types of maintenance previously applied to a pavement section must be determined before a new strategy is selected. For example, a pavement with a large patched or replaced portion may have had many distress problems which are likely to continue in the future, and which should be considered in the new strategy.

(2) The evaluation of previous maintenance can be based on the incidence of permanent patching (asphalt pavements), large areas of patching (more than 5 square feet), and/or slab replacement (concrete pavement). Patching and/or slab replacement ranging between 1.5 and 3.5 percent (based on surface area for asphalt and number of slabs for concrete) is considered normal; more than 3.5 percent is considered high, and less than 1.5 percent is considered low. Some pavement sections may have received an excessive

amount of maintenance other than patching. If the engineer feels that a section should be evaluated as having high previous maintenance, then this evaluation should take precedence over evaluation criteria based on only patching and slab replacement. In our example, figure 4-1, patching was in excess of 3.5 percent; so "High" was circled at line 8.

*i. Comments.* Any specific requirements or items that might have an impact on the selection of feasible alternatives should be noted on the form.

#### 4-3. Determination of feasible M&R alternatives

*a. Assumption.* In the process of selecting feasible alternatives, one of the primary assumptions is that the strategy will be implemented within 3 years.

*b. Procedure.* The process of selecting feasible M&R alternatives is summarized in figure 4-9 and is described below.

##### (1) Determine M&R strategy.

(a) The purpose of this step is to identify the pavement sections that need comprehensive analysis. The data required for the identification are the PCI, distress, pavement rank, pavement usage, traffic, and management policy.

(b) Based on the factors in (a) above, a limiting PCI value is established for each type of pavement; e.g., 75 for primary roads with traffic volume exceeding 10,000 vehicles per day, and 70 for primary roads with traffic volume less than or equal to 10,000 vehicles per day. If a pavement has a PCI above the limiting value, continuation of existing maintenance policy is recommended unless review of the distress data shows that the majority of distress is caused by inadequate pavement strength and/or the rate of pavement deterioration is thought to be high. If any of these factors exists, proceed with the methods listed in (c) below; if not, determine feasible M&R alternatives as discussed in (2) below.

(c) If the M&R strategy decision is to continue existing maintenance policy, the information in tables 4-4 and 4-5 is used as a guide to select the appropriate maintenance method. These tables present feasible maintenance methods for each distress type at a given severity level. If the distress does not have any severity level, the letter "A" is used in place of the severity level. For example, for pumping distress in concrete pavements, the appropriate maintenance method (depending on existing conditions) could be crack sealing, joint sealing, and/or undersealing of the slabs.

(2) Determine feasible M&R alternatives based on pavement condition evaluation summary (fig 41).

(a) The purpose of this step is to determine whether alternatives other than existing maintenance policy should be considered (e.g., overlay or recycling), and, if so, what specific feasible alternatives to consider. This is done by analyzing the section evaluation summary (fig 4-1) for the pavement section under consideration. Based on this analysis, existing maintenance would usually be recommended except when one or more of the following conditions exists:

1. Long or short-term rate of pavement deterioration is high.
2. Load-carrying capacity is deficient (indicated by a "Yes" rating on the summary sheet).
3. Load-associated distress accounts for a majority of the distress deduct value.
4. Surface roughness is rated major.
5. Skid resistance/hydroplaning potential is rated major.
6. Previous M&R applied is rated high.
7. A change in mission requires greater load-carrying capacity.

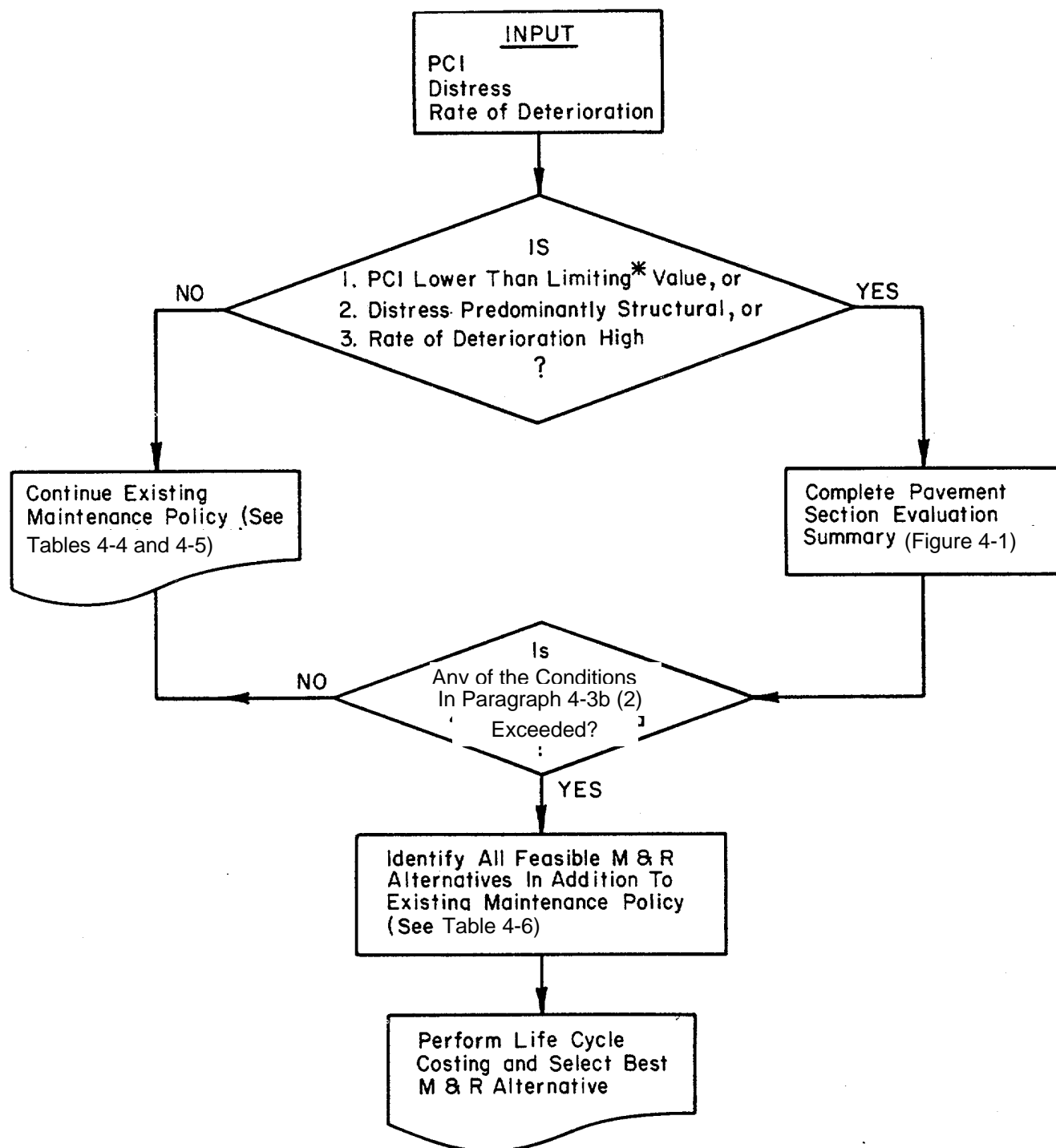
(b) Table 4-6 lists most of the available overall repair procedures for asphalt and jointed concrete pavements.

(c) All feasible alternatives should be identified based on a careful analysis of the section evaluation summary (fig 4-1). Life-cycle cost analysis of the feasible alternatives will help rank the alternatives based on cost, and thus provide necessary information for selecting a cost-effective M&R alternative. A procedure for performing a life-cycle cost analysis is described in chapter 5.

#### 4-4. Establishing M&R priorities

*a. Criteria.* The criteria for establishing priorities for pavement sections where routine M&R is required are different from those used for sections which need major M&R.

*b. Routine M&R.* Priorities for sections requiring routine M&R are a function of existing individual distress types and severity's. A single method is usually applied for a given area, which may consist of many sections, rather than different M&R methods for one section. Distresses that may have a considerable negative effect on the section's operational performance are usually corrected first. For example, medium and high-severity bumps, corrugations, potholes, and shoving would usually receive high priority.



\*SEE PARAGRAPH 4-3B (1) (B) FOR EXAMPLES OF  
PCI LIMITING VALUES.

Figure 4-9. Process of determining M&R needs.

Table 4-4. Asphalt Concrete Pavement Distress Types and M&amp;R Alternatives.

Distress Type	M&R Method	Do Nothing	Crack Seal	Partial Depth Patch	Full Depth Patch	Skin Patch	Pothole Filling	Apply Heat & Roll Sand	Apply Surface Seal Emulsion	Apply Rejuvenation	Apply Aggregate Seal Coat	Notes
1 Alligator Cracking				M,H	M,H				L	L		
2 Bleeding		L						L,M,H				
3 Block Cracking		L	L,M,H							L	L,M	
4 Bumps & Sags		L		M,H	M,H	M,H						
5 Corrugation		L		M,H	M,H							
6 Depression		L		M,H	M,H	M,H						
7 Edge Cracking		L	L,M	M,H	M,H							If predominant, apply shoulder seal, e.g., aggregate seal coat
8 Joint Reflective Cracking		L	L,M,H	H								
9 Lane/Shoulder Drop Off		L										If predominant, level off shoulder and apply aggregate seal coat
10 Longitudinal Transverse Cracking		L	L,M,H	H					L	L	L,M	
11 Patching & Utility Cut		L	M	H*	H*							*Replace patch
12 Polished Aggregate		A									A	
13 Potholes				L	L,M,H		L,M,H					
14 Railroad Crossing		L				L,M,H						
15 Rutting		L		L,M,H	M,H	L,M,H						
16 Shoving		L		M,H								
17 Slippage Cracking		L	L	M,H								
18 Swell		L			M,H							
19 Weathering & Raveling		L		H					L,M	L	M,H	

Note: L = low severity; M = medium severity; H = high severity; A = has only one severity level.

Table 4-5. Jointed Concrete Pavement Distress Types and M&amp;R Alternatives.

Distress Type	M&R Method	Do Nothing	Crack Sealing	Joint Sealing	Partial Depth Patch (Bonded)	Full Depth Patch	Slab Replacement	Under-Sealing	Grinding Slab	Slab Jack-Grout	Notes
21 Blow-ups					L*,M*	H*	H*				*Must provide expansion joint
22 Corner Break		L	L,M,H			M,H	H				
23 Divided Slab			L,M				M,H				
24 'D' Cracking		L	L*	L*	M,H	M,H	H				*If "D" cracks exist, seal all joints and cracks
25 Faulting		L					H		M,H	M,H	
26 Joint Seal Damage		L		M*,H							*Joint seal local areas
27 Lane/Shoulder Drop Off		L									If predominant, level off shoulder, apply aggregate seal coat
28 Linear Cracking		L	L,M,H		H*	H	H				*Allow crack to continue through patch except when using A-C
29 Large Patch & Utility Cuts		L	M		M*,H*	H*	H				*Replace patch
30 Small Patching		L	M		M*,H*	H*					*Replace patch
31 Polished Aggregate		A									If predominant, apply major or overall repair, e.g. overlay grooving
32 Popouts		A									
33 Pumping			A	A				A			
34 Punchouts		L	L,M			M,H	H				
35 Railroad Crossing		L									If M or H, level surface
36 Scaling/Map Cracks/Crazing		L			M,H	H					
37 Shrinkage Cracks		A									
38 Corner Spalling		L			L,M,H						
39 Joint Spalling		L		L	M,H	M,H*					*If caused by keyway failure, provide load transfer

Note: L = low severity; M = medium severity; H = high severity; A = has only one severity level.

Table 4-6. Types of Overall Repair for Jointed Concrete and Asphalt-Surfaced Pavements.

Table 4-6. Types of Overall Repair for Jointed Concrete and Asphalt-Surfaced Pavements.

Jointed-Concrete-Surfaced Pavements

1. Overlay with unbonded, partially bonded, or fully bonded Portland cement concrete (rigid overlay).
2. Overlay with all-bituminous or flexible overlay (nonrigid overlay).
3. Portland cement concrete pavement recycling\* -a process by which an existing Portland cement concrete pavement is processed into aggregate and sand sizes, then used in place of, or in some instance with additions of conventional aggregates and sand, into a new mix and placed as a new Portland cement concrete pavement.
4. Pulverize existing surface in place, compact with heavy rollers, place aggregate on top, and overlay.
5. Replace keel section, i.e., remove central portion of pavement section (subjected to much higher percentage of traffic coverages than rest of pavement width) and replace with new pavement structure.
6. Reconstruct by removing existing pavement structure and replacing with a new one.
7. Grind off thin layer of surface if predominant distress is scaling or other surface distresses; overlay may or may not be applied.
8. Groove surface if poor skid resistance/hydroplaning potential, is the main reason for overall M&R.

Asphalt or Tar-Surfaced Pavements

1. Overlay with all-bituminous or flexible overlay.
2. Overlay with Portland cement concrete (rigid overlay).
3. Hot-mix asphalt pavement recycling\* -one of several methods where the major portion of the existing pavement structure (including in some cases, the underlying untreated base material) is removed, sized, and mixed hot with added asphalt cement at a central plant. Process may also include the addition of new aggregate and/or a softening agent. The finished product is a hot-mix asphalt base, binder surface course.
4. Cold-mix asphalt pavement recycling\*\*-one of several methods where the entire existing pavement structure (including, in some cases, the underlying untreated base material) is processed in place or removed and processed at a central plant. The materials are mixed cold and can be reused as an aggregate base, or asphalt and/or other materials can be added during mixing to provide a higher-strength base. This process requires use of an asphalt surface course or surface seal coat.
5. Asphalt pavement surface recycling\* -one of several methods where the surface of an existing asphalt pavement is planed, milled, or heated in place. In the latter case, the pavement may be scarified, remixed, relaid, and rolled. In addition, asphalts, softening agents, minimal amounts of new asphalt hot-mix, aggregates, or combinations of these may be added to obtain desirable mixture and surface characteristics. The finished product may be used as the final surface, or may, in some instances, be overlaid with an asphalt surface course.
6. Apply a porous friction course to restore skid resistance and eliminate hydroplaning potential.
7. Replace keel section, i.e., remove central portion of pavement feature (subjected to much higher percentage of traffic coverage than rest of pavement width) and replace with new pavement structure.
8. Reconstruct by removing existing pavement structure and replacing with a new one.

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\* Federal Highway Administration, Initiation of National Experimental and Evaluation Program (NEEP) Project No. 22, Pavement Recycling ([FHWA] Notice N 5080.64 June 3, 1977).

\*\* Federal Highway Administration Initiation of National Experimental Evaluation Program (NEEP) Project No. 22, Pavement Recycling ([FHWA] Notice N 5080.64 June 3, 1977).



c. *Major M&R.* Priorities among sections requiring major M&R are a function of the overall section condition, as reflected in the PCI, traffic, and management policies. For example, a decision might be made to repair all primary roads with a PCI of less

than 50, secondary roads with a PCI of less than 40, and parking lots with a PCI of less than 30. The above PCI limits are provided as an example. Local conditions at Army installations and commands will dictate what actual values to use.